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3333 U.S. PTO  
08/770388PASSENGER CONVEYOR SAFETY APPARATUSADRIANE  
3/5/97Background of the Invention:5      Field of the Invention:

The invention relates generally to continuous passenger conveyor assemblies such as escalators and moving walkways, and more particularly, to an apparatus for preventing passenger and apparel entrapment in the

10 conveyor assembly.

Description of the Related Art:

In all escalator systems and moving walkways, a running clearance gap exists between the lateral edges of the

15 moving stairs or walkway and the adjacent, stationary skirt panel. The gap allows the movement of the stairs or walkway without contacting the skirt panel.

Consequently, various objects may intrude into this open gap and become entrapped therein. Objects such as

20 passenger body extremities including fingers or toes or passenger apparel such as footwear, loose clothing and the like, come in contact with the skirt panel. The frictional force between the contacting object and the skirt panel induce the object into the gap. When the

25 entrapment occurs, the pinching, drawing and knurling action exerted on the trapped object results in the cutting and mutilation of the entrapped object.

Various prior art safety devices for escalators and moving walkways are known for preventing accidents.

One such safety device is shown in U.S. Patent No.

5 5,082,102 to Reichmuth. Reichmuth teaches a safety apparatus which covers the gap between the movable step and the stationary skirt panel. The safety apparatus is formed of a synthetic material with a low coefficient of friction. The safety apparatus is fastened to the  
10 escalator step and glides against the skirt panel. The installation of the safety apparatus requires the clearance of the passage between the step and the skirt panel be increased. The time and costs for installing the safety apparatus are significant. In addition, there  
15 is introduced a device which is in constant frictional contact with the skirt panel leading to increased maintenance and operational costs.

U.S. Patents Nos. 4,519,490 to White, 4,397,383 to James,  
20 3,986,595 to Asano et al. and 5,242,042 to Mauldin show various types of gap covering devices. However, all of them have a significant cost in installation, maintenance and operations.

Summary of the Invention:

It is accordingly an object of the invention to provide a passenger conveyor safety apparatus, which overcomes the herein-mentioned disadvantages of the heretofore-known devices of this general type, and which provides an inexpensive and easy to install apparatus for preventing objects and body extremities from being entrapped in a gap of a conveyor assembly.

10 With the foregoing and other objects in view there is provided, in accordance with the invention, an escalator or a moving sidewalk having a skirt panel and, a step or a walk path, defining a gap between the skirt panel and the step or the walk path, a passenger conveyor safety apparatus comprising a main body member having a recessed groove formed therein; and a set of brushes residing in the recessed groove, protruding out from the main body member and extending past the gap for preventing an object from being entrapped in the gap.

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In accordance with an added feature of the invention, the set of brushes has a back plate and brush bristles.

In accordance with an additional feature of the invention, the brush bristles are perpendicular to the main body member.

In accordance with another feature of the invention, the brush bristles are at an angle from 0 - 90 degrees in relation to the main body member.

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In accordance with an additional feature of the invention, the brush bristles are shorter increasingly longer up to a desired length for covering the gap, as seen along the back plate.

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In accordance with an added feature of the invention, there is a set of hinged locking members connected at both ends of the recessed groove on the main body member for locking and releasing the set of brushes in the recessed groove.

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In accordance with yet another feature of the invention, the main body member has a plurality of holes for receiving a fastener to attach the main body member to the skirt panel.

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In accordance with a concomitant feature of the invention, there is a switch disposed in the recessed groove for causing a warning signal to be emitted upon the switch being contacted by the set of brushes.

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In the invention of the instant application, there is provided a passenger conveyor safety apparatus which is inexpensive to install and is easy to maintain. Once installed the only maintenance cost would be replacement  
5 of the brush set. The configuration of the passenger conveyor safety apparatus allows for a quick and easy brush replacement process. Because the brushes do not come into contact with the moving steps or walkway, the wear and tear on the brushes is minimal. In contrast,  
10 the prior art devices are in constant frictional contact with the skirt panel resulting in higher maintenance requirements. In addition, the passenger conveyor safety apparatus can be installed without requiring major modification to the escalator or moving walkway. The  
15 escalator or moving walkway need only have holes drilled in the skirt panel for installation of the passenger conveyor safety apparatus.

With the foregoing and other objects in view there is  
20 provided, in accordance with the invention, an escalator or a moving sidewalk having a skirt panel and, a step or a walk path, defining a gap between the skirt panel and the step or the walk path, a passenger conveyor safety apparatus comprising a main body member and a warning  
25 device residing on the main body member for causing a

warning signal to be emitted upon an object approaching the gap. ✓

In accordance with an added feature of the invention, the  
5 warning device is a light being illuminated upon the object approaching the gap.

In accordance with another feature of the invention, the warning device is a light beam transmitting device  
10 sounding an audible alarm upon the object approaching the gap.

Other characteristic features of the invention are set forth in the appended claims.

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Although the invention is illustrated and described herein as embodied in a passenger conveyor safety apparatus, it is nevertheless not intended to be limited to the details shown, since various modifications and  
20 structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction of the invention, however, together with  
25 additional objects and advantages thereof will be best understood from the following description of the specific

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embodiment when read in connection with the accompanying drawings.

Brief Description of the Drawings:

5 Fig. 1 is a diagrammatic, fragmentary, perspective view of a section of a typical escalator;

Fig. 2 is a fragmentary, side-elevation view of the escalator with a passenger conveyor safety apparatus  
10 installed according to the invention;

Fig. 3a is a front-elevational view of the passenger conveyor safety apparatus;

15 Fig. 3b is a front-elevational view of the passenger conveyor safety apparatus with a set of brushes partially removed;

Fig. 3c is a side-elevation view of the passenger  
20 conveyor safety apparatus highlighting a groove for holding the set of brushes.

Fig. 4a is a top-plan view of the brushes;

25 Fig. 4b is a top-plan view of a second embodiment of the brushes;

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Fig. 5a is a fragmentary, side-elevation view of the passenger conveyor safety apparatus pushing against a human leg;

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Fig. 5b is fragmentary, perspective view of the passenger conveyor safety apparatus.

Fig. 5c is a fragmentary, front-elevational view highlighting the set of brushes covering a gap in the escalator;

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Fig. 6 is a fragmentary, perspective view of a section of a typical moving walkway equipped with the passenger conveyor safety apparatus;

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Fig. 7 is a fragmentary, side-elevation view of the escalator with a second embodiment of the passenger conveyor safety apparatus installed; and

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Fig. 8 is a fragmentary, side-elevation view of the escalator with a third embodiment of the passenger conveyor safety apparatus installed according to the invention.



Description of the Preferred Embodiments:

Referring now to the figures of the drawings in detail and first, particularly, to Fig. 1 thereof, there is shown a typical escalator 1 having movable steps 2, a stationary skirt panel 3 and a gap 4 between the movable steps 2 and the skirt panel 3.

Fig. 2 shows a passenger conveyor safety apparatus 5 installed on the skirt panel 3 of the escalator 1. The passenger conveyor safety apparatus 5 has a removable set of brushes 6 and a main body member 7.

Figs. 3a, 3b and 3c show an enlarged view of the passenger conveyor safety apparatus 5. A main body member 7 has a plurality of holes 12 which accommodate unillustrated fasteners such as screws or rivets for fastening the passenger conveyor safety apparatus 5 to the skirt panel 3 as shown in Fig. 2. The main body member 7 also has a recessed groove 8 for accepting and holding a set of brushes 6. When worn out, the brushes 6 can be quickly replaced by sliding the old brush set 6 out of recessed groove 8 and inserting a new set of brushes 6. At both ends of the recessed groove 8 are hinged locking members 13. The hinged locking members 13 rotate around the axis of hinge 16. The hinged locking members 13 in the upright (closed) position secure the

set of brushes in the recessed groove 8. When the hinged locking member 13 is in the open position, as shown in Fig. 3c, the set of brushes 6 may be removed. In addition, Fig. 3b shows a plurality of switches 19. If the set of brushes makes contact with the switch a warning signal is emitted. The warning signal can be an audio alarm or a light alarm contained on the switch. The set of brushes will activate the switch when an object pushes against the set of brush with sufficient force to push the set of brushes into the switch.

Figs. 4a and 4b show two embodiments of the set of brushes 6. The brushes 6 are configured with a back plate 9 holding brush bristles 10. The back plate 9 is configured to slide in the recessed groove 8 of the main body member 7. The brush bristles 10 can be configured to protrude straight out from the back plate 9 as shown in Fig. 4a. The brush bristles 10 can also protrude in a downward direction and/or in an angled direction that is directed toward the movement of the steps as is shown by direction arrows 17 and 18. The angle can be anywhere from 0 - 90 degrees in relationship to the main body member 7. The brush bristles 10 can be configured in various lengths depending on the size of the gap 4 or the level of coverage over the gap 4 that is desired. The brush bristles 10 can also be configured to be initially

short and then become increasingly long as shown in Fig. 4b. That configuration will allow less of a starting friction in the initial contact with the passenger conveyor safety apparatus 5.

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Fig. 5a shows the passenger conveyor safety apparatus 5 coming into contact with a human leg 11 and pushing against the human leg 11. Figs. 5b and 5c show how the brush bristles 10 extend over the gap 4 and prevent an  
10 object such as the leg 11 from coming into contact with the gap 4. Fig. 5c shows the brush bristles 10 pushing on a leg 11 shown in the direction from toe to heel. In addition, the passenger conveyor safety apparatus 5 prevents contact with the skirt panel 3. An object that  
15 comes into contact with the skirt panel 3 experiences a frictional force that moves the object in the direction of the gap 4. Because the passenger conveyor safety apparatus reduces contact with the skirt panel 3, the accidents caused by the skirt panel's 3 frictional forces  
20 are also reduced.

Fig. 6 shows a typical moving walkway 14 equipped with the passenger conveyor safety apparatus 5. The moving walkway 14 has a walk path 15, a skirt panel 3 and a gap  
25 4 between the skirt panel 3 and the walk path 15. Although the invention is illustrated to be used with an

escalator or a moving walkway, it can easily be configured to be applied to any device that has an exposed gap 4.

- 5 Fig. 7 shows a second embodiment of the passenger conveyor safety apparatus 5. The main body member 7 contains a warning device such as a light 20. The light illuminates when an object approaches the light 20. As shown in Fig. 7, the light 20 is in close proximity to
- 10 the gap 4. In addition, the light 20 can be illuminated at all times. When the object comes in closer proximity to the light, the illumination level of the light increases and thus provides a visual warning.
- 15 Fig. 8 shows a third embodiment of the passenger conveyor safety apparatus 5. The main body member 7 contains a warning device such as a light beam transmitting device 21 which has a built in audio alarm. When a light beam from the light beam transmitting device is broken, the
- 20 light beam transmitting device emits an audible warning signal or alarm.